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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/602,289	06/24/2003	Takeshi Endo	15162/05510	1183

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EXAMINER	
LAVARIAS, ARNEL C	

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 06/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/602,289	ENDO ET AL.	
	Examiner	Art Unit	
	Arnel C. Lavarias	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) *2-4,10 and 13-21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-9,11 and 12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The replacement drawings were received on 4/14/06. These drawings are acceptable.

Response to Amendment

2. The amendments to specification of the disclosure in the submission dated 4/14/06 are acknowledged and accepted. In view of these amendments, the objections to the specification in Section 10 of the Office Action dated 1/10/06 are respectfully withdrawn.

3. The amendments to Claims 5, 7 in the submission dated 4/14/06 are acknowledged and accepted. In view of these amendments, the objections to the claims in Section 11 of the Office Action dated 1/10/06 are respectfully withdrawn.

Response to Arguments

4. The Applicants argue that with respect to Claim 1, as well as Claims 5-9, 11-12 which depend on Claim 1, Endo et al. does not specifically disclose the transmissive diffuser plate being holographic. After reviewing Endo et al., the Examiner agrees, and respectfully withdraws the rejections in Sections 13-16 of the Office Action dated 1/10/06.

5. The Applicants further argue that Tedesco fails to teach or reasonably suggest "a reflection type hologram... the reflection type hologram having diffusing properties." The Examiner respectfully disagrees. Tedesco specifically discloses a holographic

diffuser (See 43 in Figures 2-3) that has been rendered reflective by the use of a reflecting layer (See 44 in Figures 2-3). It is noted that the recited claim language does not preclude the reflection type hologram being made with a reflective layer, nor does the recited claim language proffer any particular method of fabrication for the reflection type hologram. Applicants may refer to Tedesco et al. (U.S. Patent No. 5471327) regarding the realization of a reflective holographic diffuser either through the use of a transmissive type holographic diffuser disposed against a reflector, or a reflective type holographic diffuser which is directly recorded and thus avoids the use of a reflective surface (See Figure 4; col. 4, lines 1-13 of Tedesco et al.).

6. The Applicants further argue that, with respect to Claims 5-6, Khazova et al. fails to teach or reasonably suggest "a reflection type hologram... the reflection type hologram having diffusing properties." The Examiner respectfully disagrees. Khazova et al. specifically discloses a holographic diffuser (See 61' in Figure 19) that has been rendered reflective by the use of a reflecting layer (See Page 59, line 23-Page 60, line 15). Again, it is noted that the recited claim language does not preclude the reflection type hologram being made with a reflective layer, nor does the recited claim language proffer any particular method of fabrication for the reflection type hologram.

7. The Applicants finally argue that, with respect to Claims 7-9, Abbott et al. fails to teach or reasonably suggest "a reflection type hologram... the reflection type hologram having diffusing properties." However, it is noted that Abbott et al. was not cited to evidence a reflection type hologram, and instead was cited to evidence the known diffusing anisotropy characteristics recited in Claims 7-9.

8. Claims 1, 5-9, 11-12 are now rejected as follows.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1, 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endo et al. (U.S. Patent Application Publication US 2002/0030773 A1), of record, in view of Hockley et al. (U.S. Patent No. 5046793) and Tedesco (U.S. Patent No. 5418631), of record.

Endo et al. discloses an image display apparatus (See for example Figures 1-10) comprising a light source section (See 1, 1R, 1G, 1B in Figures 1-10) for supplying an illumination light; a display element (See 5 in Figures 1-10) for modulating a given illumination light into an image light showing an image; a transmission type diffuser element (See 2 in Figures 1-10) for diffusing and transmitting the illumination light from the light source section so as to guide the illumination light to the display element, the transmission type diffuser element having diffusing properties; and an eyepiece optical system (See 6, 6a, 6b in Figures 1-10) for guiding the image light from the display element to an eye of a viewer so as to provide an enlarged virtual image of the image. Endo et al. additionally discloses the light source section supplying divergent light as the illumination light (See 1 in Figures 1-10); the light source section having a light emitting

diode (See for example Paragraph 0035); and the display element being a liquid crystal display element (See for example Paragraph 0034). Endo et al. lacks the transmission type diffuser element being a hologram that is of the reflective type. However, Hockley et al. teaches a conventional holographic diffuser that may be utilized in place of a conventional real volume or surface scattering diffuser (e.g. ground glass plate, fiber optic face plate diffuser) for diffusing incident light (See Abstract; 50 in Figure 5) via diffraction. In addition, Hockley et al. teaches that such holographic diffusers may be utilized in display device, e.g. slide projector (See for example Figures 3-5). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the transmission type diffuser element of Endo et al., be a hologram, as taught by Hockley et al., to take advantage of the improved brightness uniformity over the diffuser surface, increased image brightness, and chromatic correction provided by the holographic diffuser. The combined teachings of Endo et al. and Hockley et al. lack the holographic diffuser being of the reflection type. However, Tedesco teaches a conventional illumination system for a flat panel liquid crystal display system (See for example Figures 2-4), wherein a reflective type hologram having diffusing properties and for diffracting and reflecting illumination light is utilized in the illumination beam path (See for example 16, 43, 44 in Figures 2-3; col. 3, line 62-col. 4, line 31). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the holographic diffuser be of a reflection type, as taught by Tedesco, in the display apparatus of Endo et al. and Hockley et al., to allow for repositioning of the

illumination source based on the intended application, while allowing the optical system to be compact.

11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Endo et al. in view of Hockley et al. and Tedesco as applied to Claim 1 above, and further in view of Khazova et al. (WO 00/08519 A2), of record.

Endo et al. in view of Hockley et al. and Tedesco discloses the invention as set forth above in Claim 1, except for the reflection type hologram having positive optical power and changing the illumination light into a substantially parallel light. However, Khazova et al. teaches a conventional illumination system for a liquid crystal display device (See for example Figures 9, 19) which utilizes a reflective type hologram having diffusive properties (See 61' in Figure 19). In particular, the reflective type hologram includes positive optical power and converts the incident diverging light from the illumination source to collimated light that is routed to the viewing zone (See Page 59, line 23-Page 60, line 15). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the reflection type hologram have positive optical power and change the illumination light into a substantially parallel light, as taught by Khazova et al., in the display apparatus of Endo et al. in view of Hockley et al. and Tedesco, for the purpose of reducing the number of optical elements required to construct the optical system since the reflective, powered holographic element now performs the functions of several optical elements (i.e. it combines the functions of the holographic element 2 and focusing lens 3 of Endo et al./Hockley et al.), leading to reduced cost and optical alignment complexity.

12. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Endo et al. in view of Hockley et al. and Tedesco as applied to Claim 1 above, and further in view of Khazova et al.

Endo et al. in view of Hockley et al. and Tedesco discloses the invention as set forth above in Claim 1, but does not explicitly disclose the reflection type hologram separating a zero-order diffracted reflection light from a first-order diffracted reflection light in a different direction, and the display element being disposed on an optical path of the first order diffracted reflection light of the illumination light diffracted and reflected by the reflection type hologram and a downstream side of position where the zero-order diffracted reflection light is substantially separated from the first order diffracted reflection light. However, Khazova et al. teaches a conventional illumination system for a liquid crystal display device (See for example Figures 9, 19) which utilizes a reflective type hologram having diffusive properties (See 61' in Figure 19). In particular, the reflection type hologram separates the zero-order diffracted reflection light from the first order diffraction light (See for example 61 in Figures 9, 19, wherein the zero order light from 61 is denoted by the dashed lines, and the first order light is denoted the solid lines routed to the viewing zone), and the display element (See 62, 63 in Figures 9, 19) is disposed on an optical path of the first order diffracted reflection light of the illumination light diffracted and reflected by the reflection type hologram and a downstream side of position where the zero-order diffracted reflection light is substantially separated from the first order diffracted reflection light. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the reflection type

hologram separate a zero-order diffracted reflection light from a first-order diffracted reflection light in a different direction, and the display element be disposed on an optical path of the first order diffracted reflection light of the illumination light diffracted and reflected by the reflection type hologram and a downstream side of position where the zero-order diffracted reflection light is substantially separated from the first order diffracted reflection light, as taught by Khazova et al., in the display apparatus of Endo et al. in view of Hockley et al. and Tedesco, for the purpose of reducing or eliminating optical noise (such as from Fresnel or multiple reflections) in the viewed image, thus improving visibility, brightness uniformity, and sharpness of the viewed image.

13. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endo et al. in view of Hockley et al. and Tedesco as applied to Claim 1 above, and further in view of Abbott et al. (U.S. Patent No. 5999281), of record.

Endo et al. in view of Hockley et al. and Tedesco discloses the invention as set forth above in Claim 1, but does not explicitly disclose the reflection type hologram having diffusing anisotropy and makes a diffusing angle of the diffracted and reflected illumination light different in two direction which cross perpendicular to each other, the diffusion angle of the reflection type hologram in horizontal direction with respect to the viewer being larger than that in the vertical direction or the diffusion angle of the reflection type hologram being larger than that in a direction of a line of intersection between the reflection type hologram and a plane including a center of the display element, an emission point of the light source section, and a center of the reflection type hologram. However, Abbott et al. teaches that conventional diffusion hologram screens

for image display systems (See Abstract; 10 in Figures 3, 7) may be constructed in such a way that the diffusion hologram exhibits diffusing anisotropy and makes a diffusing angle of the diffracted and reflected illumination light different in two direction which cross perpendicular to each other (In the instant case, the diffusing anisotropy may be made elliptical, as opposed to circular. See 115 in Figures 3, 7). Further, the diffusion angle of the reflection type hologram in the horizontal direction (X direction as shown in Figure 7) with respect to the viewer may be made larger than that in the vertical direction (Y direction as shown in Figure 7) (See 115 in Figures 3, 7). It is also noted that this horizontal direction (X direction as shown in Figure 7) is a direction that is different than that direction defined by a line of intersection between the diffusion hologram and a plane including a center of the display element, an emission point of the light source section, and a center of the diffusion hologram (i.e. the Y direction as shown in Figure 7). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the reflection type hologram have diffusing anisotropy and make a diffusing angle of the diffracted and reflected illumination light different in two direction which cross perpendicular to each other, the diffusion angle of the reflection type hologram in horizontal direction with respect to the viewer being larger than that in the vertical direction or the diffusion angle of the reflection type hologram being larger than that in a direction of a line of intersection between the reflection type hologram and a plane including a center of the display element, an emission point of the light source section, and a center of the reflection type hologram, as taught by Abbott et el., in the display apparatus of Endo et al. in view of Hockley et al. and Tedesco, to take advantage

of the improved brightness consistency, reduced lateral color shift, and high diffraction efficiency provided by the diffusion hologram of Abbott et al.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 5471327 to Tedesco et al.

Tedesco et al. is being cited to evidence conventional realizations of a reflective holographic diffuser either through the use of a transmissive type holographic diffuser disposed against a reflector, or a reflective type holographic diffuser which is directly recorded and thus avoids the use of a reflective surface (See Figure 4; col. 4, lines 1-13).

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Arnel C. Lavarias
Patent Examiner
Group Art Unit 2872
6/12/06

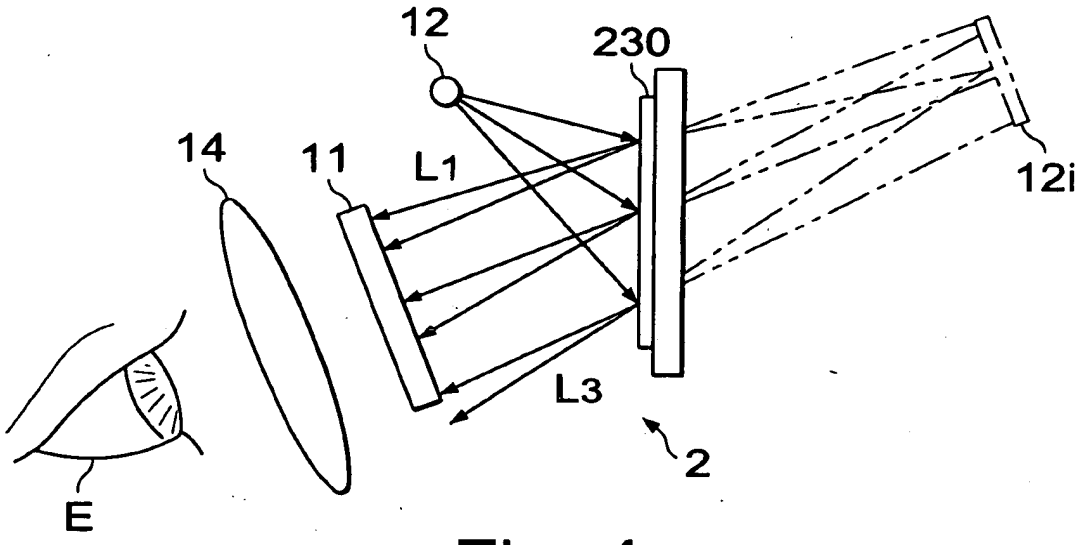

Fig. 4

Drawing changes
Approved
ACC
6/12/06

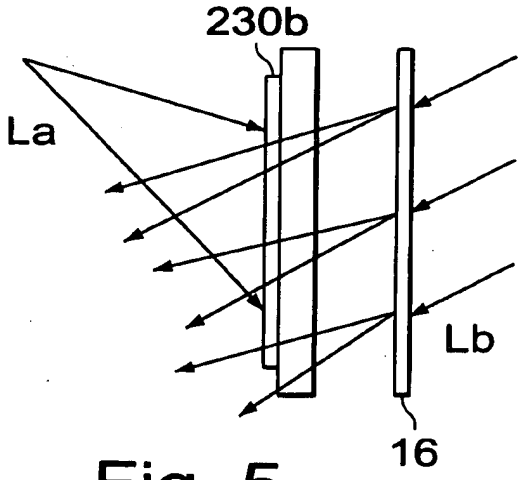

Fig. 5

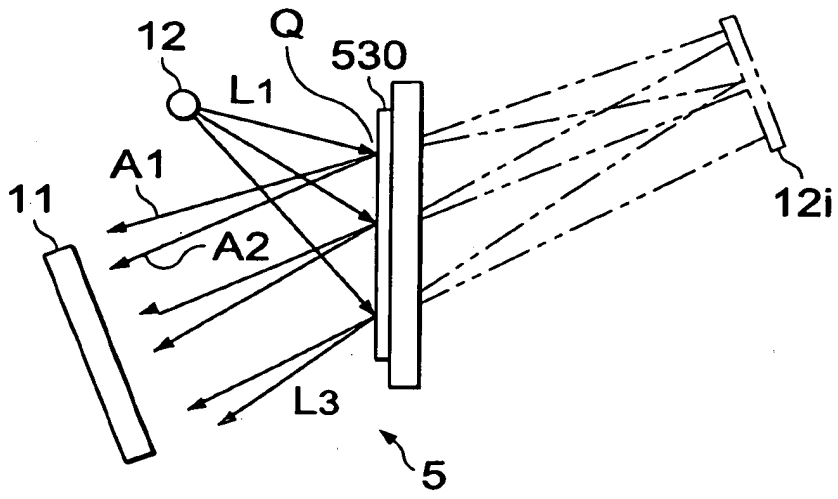

Fig. 11

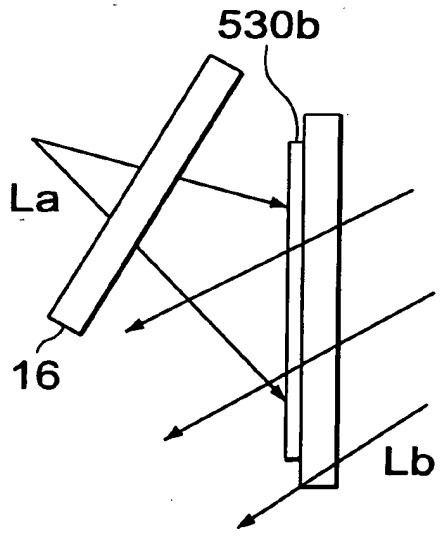

Fig. 12